APPENDIX B
TO LESSON PLAN 1

INTRODUCTION TO TWGSS

STUDENT HANDOUT

B-1. PURPOSE OF TWGSS.

a. The TWGSS is a tank-mounted training device that aids the crew in gaining and improving proficiency in gunnery skills without the expenditure of live ammunition.

b. Gunnery and tactical training can be conducted anywhere that eye-safe laser firing is permitted.

c. TWGSS provides the crew with visual and sound effects which accurately simulate real firing conditions.

B-2. FUNCTIONAL CONFIGURATION.

a. The TWGSS simulates the firing of the tank's main gun, the firing of the coaxially-mounted machine gun, and the effects of a target tank being hit.

b. The TWGSS consists of three subsystems: firing system, target system, and Training Data Retrieval System (TDRS).

(1) **Firing system.** TWGSS simulates the firing ballistic characteristics of ammunition and the visual and sound effects of firing.

(2) **Target system.** The target system receives firing information from an attacking weapon, equipped with a laser training device, and notifies the crew of the effects of the attack. The attack could come from another TWGSS-equipped tank, a Precision Gunnery System (PGS)-equipped infantry/cavalry fighting vehicle, or a Multiple Integrated Laser Engagement System (MILES)-equipped unit. An instructor using the control gun (CGUN) can also communicate with the TWGSS target system.

(3) **TDRS.** The TDRS is used to evaluate the effectiveness of the firing engagements whether in a tank weapon gunnery exercise or a tactical training environment. The TDRS provides real time analysis for each round fired and engagement undertaken. For more information on TDRS, refer to TM 9-6920-711-12&P-1.

B-3. FEATURES AND CAPABILITIES.

a. Simulates tank firing and ammunition effect on targets.

b. Provides full fire control interface to enable the tank crew to train using normal engagement techniques.

c. Provides training capabilities utilizing Class 3A (conditionally eye safe) eye-safe laser.

d. Interoperable and compatible with PGS, MILES, Laser Target Interface Device (LTID), and Improved Tank Gunfire Simulator (ITGS) (Hoffman Device).

e. Provides panel gunnery training, target tracking training, scalable target capability, and combat training in a realistic environment with immediate feedback.

f. Simulates the visual effects of the main gun and coaxially-mounted machine gun. These simulations include tracer, tracer burst on target, burst on ground, and obscuration images.

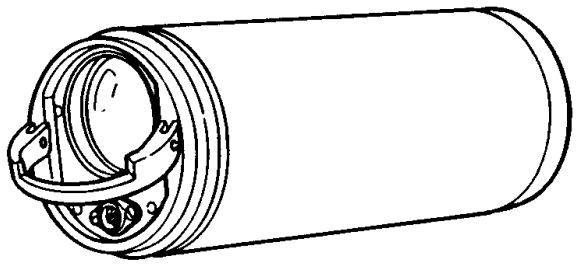
g. Provides firing sound effects over tank intercom to include built-in test (BIT) indications. These sound effects include:

(1) Main gunfire signature
(2) Coax gunfire signature
(3) Hit indication
(4) Ammunition loading
(5) System error indication

h. Provides and stores continuously updated vehicle position and time data information.

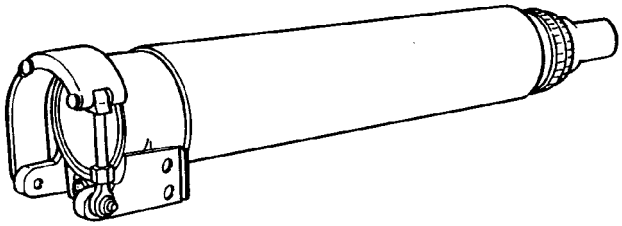
B-4. DESCRIPTION OF MAJOR COMPONENTS.

a. **Transceiver Unit.** Performs the complete weapon effect simulation. The unit is preprogrammed with the physical and operational characteristics of the weapon it is simulating and utilizes lasers to transmit pulses and receive reflections from the targets. The unit determines target position from the laser pulses and transmits the point of impact, type of ammunition, and identity of attacker to the target.

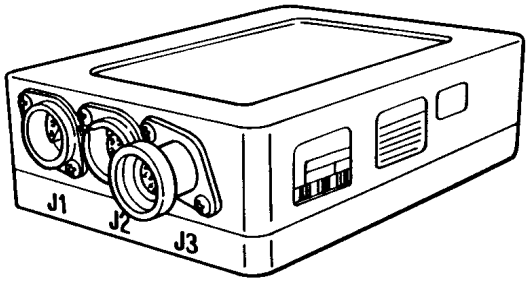


B-4. DESCRIPTION OF MAJOR COMPONENTS (Con't).

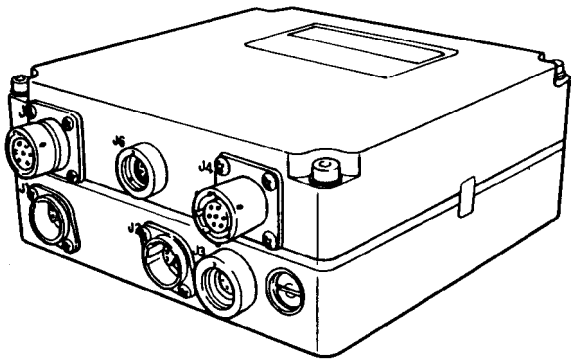
b. **Tracer, Burst, Obscuration Simulator (TBOS) Gunner's Auxiliary Sight (GAS) Assembly.** Provides obscuration, tracer, and burst effects simulation into the gunner's auxiliary sight.



c. **TBOS Driver Unit.** Provides image data of ammunition being fired, and if hit, provides burst image data to TBOS GAS unit.

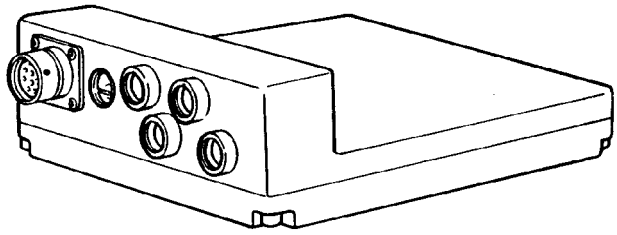


d. **Vehicle Interface Unit.** Receives electrical power from the tank and distributes power to system components. Interfaces with the expansion unit to receive/distribute weapon system status and with control panel for application data

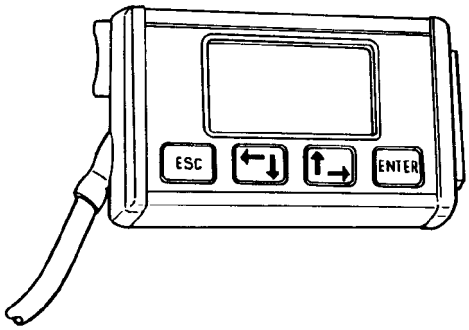


B-4. DESCRIPTION OF MAJOR COMPONENTS (Con't).

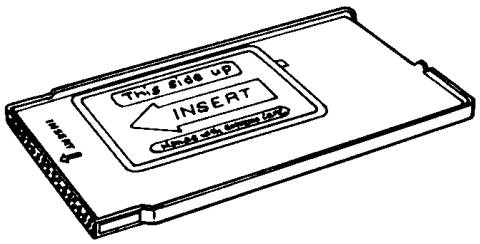
e. **Expansion Unit.** Interfaces with 1552 BUS for vehicle and fire control system status. Receives and sends signals to vehicle fire control system, and provides this information to the vehicle interface unit. Also provides audio indications to vehicle intercom.



f. **Control Panel.** Provides the means to manually input required system functions, subfunctions, and options; upload ammo; select training modes; operate system during training; align system prior to training; and view results of firing simulations and BIT error messages.

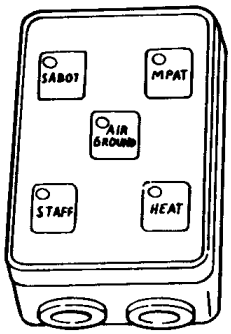


g. **TDRS Memory Card.** Stores firing and target vehicle data needed to set up M1A2 application for the intended exercise. Collects and stores exercise events collected during TWGSS training. The stored training exercise events can be retrieved for After Action Review (AAR) with the TDRS computer unit.

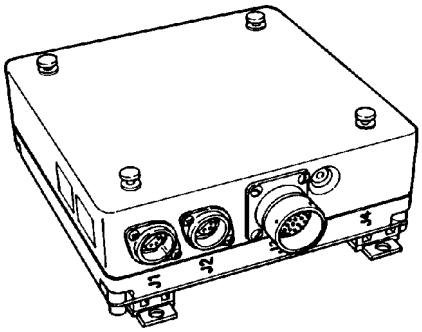


B-4. DESCRIPTION OF MAJOR COMPONENTS (Con't).

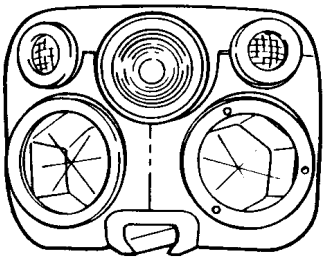
h. **Loader's Panel.** Provides loader with a method of selecting and simulating the loading of specific ammunition into main gun. Also generates sound indicators to tank intercom.



i. **TBOS Video Mixer Unit.** Mixes video-generated obscuration, tracer dot, and target effects images into sight picture of gunner's primary sight (GPS) during day or thermal modes of operation.

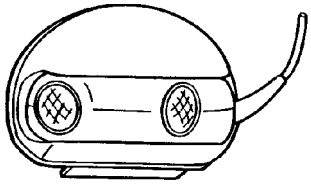


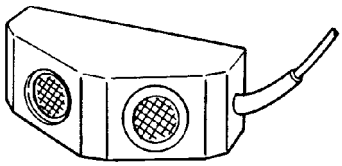
j. **Retro Detector Unit.** Consists of two reflectors, two laser detectors, and one strobe light: The reflectors reflect laser pulses back to the attacking TWGSS or PGS. The laser detectors receive hit information, including type of ammunition, identity of attacker, and hit point from attacking TWGSS, PGS, or MILES. The strobe light flashes when a tank has been hit. Four units are placed high on the turret to provide 360 degrees of coverage.



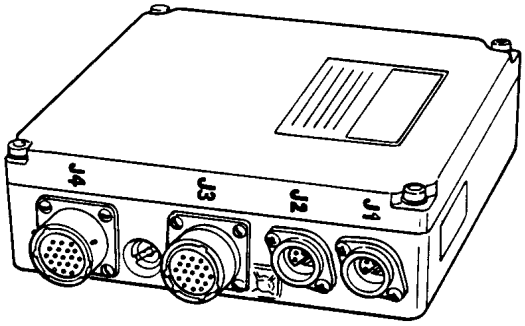
B-4. DESCRIPTION OF MAJOR COMPONENTS (Con't).

k. **Hull Defilade Detector Unit.** Senses hit to hull of tank, when tank hull is exposed. Four units are placed low on the turret to provide 360 degrees of coverage.

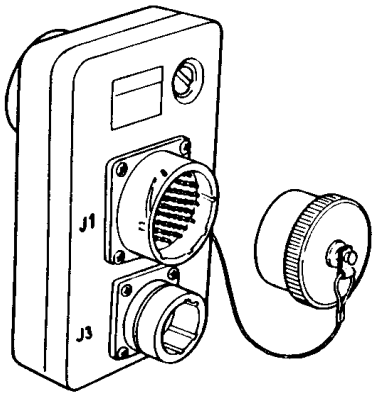




l. **Target Computer Unit.** Receives results of a simulated firing, including hit point, type of ammunition, and identity of attacker. The unit compares this information with the type of target it is programmed to simulate, its size and vulnerability, and determines if there was a near miss, hit, mobility kill, weapon kill, catastrophic kill, or no effect.

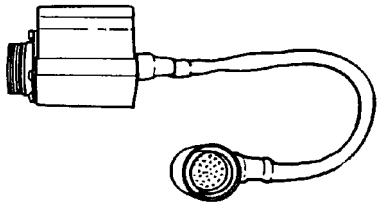


m. **Thermal Imaging System (TIS) Junction Box.** Provides connecting point for electrical input from TBOS video mixer unit to enter vehicle thermal imaging control panel.



B-4. DESCRIPTION OF MAJOR COMPONENTS (Con't).

n. **Laser Rangefinder (LRF) Node Assembly.** Provides connecting point for electrical input from system components to vehicle fire control electronics unit (FCEU).



o. **Remote System Interface (RSI) Unit.** Receives satellite signals that continuously calculate vehicle position. Provides a means to view and store the vehicle position during a training exercise. The stored vehicle position(s) and time data can be retrieved for After Action Review (AAR) with the TDRS computer unit.